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REC'D 19 AUG 2004	
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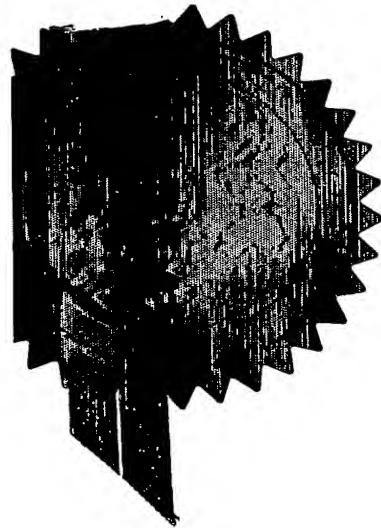
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Dated

*R. McChoney*

10 August 2004

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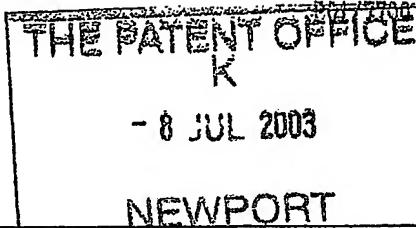
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0.00-0315904.3

**Request for grant of a patent**

*(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form.)*



The Patent Office

 Cardiff Road  
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**1. Your reference**

DLR/C1322/C

**2. Patent application number***(The Patent Office will fill in this part)*

0315904.3

- 8 JUL 2003

**3. Full name, address and postcode of the or of each applicant** (*underline all surnames*)
 C4 Carbides plc  
9 Nuffield Road  
Cambridge  
CB4 1TF

7695620001

Patents ADP number (*if you know it*)

If the applicant is a corporate body, give the country/state of its incorporation

England

**4. Title of the invention**

Saw Blades

**5. Name of your agent** (*if you have one*)
 "Address for service" in the United Kingdom to which all correspondence should be sent  
*(including the postcode)*

 Keith W Nash & Co  
90-92 Regent Street  
Cambridge  
GB2 1DP

Swindell &amp; Pearson

48 Friar Gate

Derby

DE1 1GY

 see  
#E1/77  
6/7/04
Patents ADP number (*if you know it*) 1578001**6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number**

Country

Priority application number  
*(if you know it)*Date of filing  
(day / month / year)**7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application**

Number of earlier application

Date of filing  
(day / month / year)**8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:***

Yes

- a) *any applicant named in part 3 is not an inventor, or*
- b) *there is an inventor who is not named as an applicant, or*
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*See note (d))*

Patents Form 1/77

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Continuation sheets of this form

Description

5

Claim(s)

Abstract

Drawing(s)

1 + 1 (2)

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination  
(Patents Form 10/77)

Any other documents  
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature.

Keith W. Wash Co. Date 7.7.83  
KEITH W. WASH & CO.

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12. Name and daytime telephone number of person to contact in the United Kingdom

David Roberts - 01223 355477

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1322.00/C

## **Saw Blades**

### **Field of the Invention**

This invention relates to linear edge saw blades, to methods of making linear edge saw blades and to teeth for such blades.

### **Background to the Invention**

The applicants' published PCT Specification WO 01/83143 discloses methods of making linear edge saw blades by forcing tungsten carbide inserts into apertures in a comparatively soft carrier strip. Building on this technology, the present application is directed to developments which offer the opportunity of cost savings in manufacture of linear edge saw blades and greater versatility in the choice of the characteristics of the teeth of linear edge saw blades.

### **Summary of the Invention**

According to a first aspect of the invention there is provided a plurality of hard teeth for attaching to a relatively soft common carrier strip of a linear edge saw blade, the teeth being of differing shapes and/or having different material compositions so that the resulting saw blade has teeth with different characteristics.

This aspect of the invention also provides a saw blade comprising a relatively soft carrier strip supporting a plurality of relatively hard teeth, wherein the teeth are of differing shapes and/or have different material compositions. The pitch of the teeth along the carrier strip may be constant or may vary.

A known linear edge saw blade is made by mounting identical inserts at spaced positions along a carrier strip, securing the inserts to the strip by brazing and then grinding the edges of the inserts and carrier strip to form a series of identically shaped teeth along the length of the blade. By pre-forming the inventive teeth in different shapes corresponding to the required final shape of the teeth, the grinding operations normally required to finish carbide tipped teeth are minimised or avoided, resulting in a significant cost saving. Moreover, different teeth along the length of a linear edge saw blade perform differing cutting functions dependent on their position in the cutting sequence. For example, leading teeth wear differently from trailing teeth. By recourse to the invention, individual teeth can be pre-formed to a required shape, and made of a composition as desired, without the need for substantial grinding. Thus, the characteristics of individual teeth can vary along the length of the carrier strip. In the preferred embodiment to be described, the teeth are in successive groups, with each group consisting of three teeth of different shapes, giving a successive triple cut configuration.

The invention also includes within its scope a method of making a linear edge saw blade, the method comprising fabricating a plurality of relatively hard teeth having differing shapes corresponding to the desired final shapes of the teeth of the blade, mounting the teeth at desired spaced mounting positions along a carrier strip of a relatively soft material and securing the teeth in their positions by brazing.

The mounting of the teeth in the carrier strip preferably causes deformation and displacement of the material of the carrier strip, and this may be achieved by forcing the teeth into apertures in the strip. The teeth may have teeth roots with peripheries which form cutting edges to displace the material of the strip as the inserts are forced into position.

According a yet further aspect of the invention there is provided a tooth for a linear edge saw blade, the tooth having a root for attachment to a carrier strip of the blade and a head forming a cutting portion of the tooth when the latter is advanced in the cutting direction, the root and head being separated by a transition region which, when the tooth is viewed in

side view transverse to the cutting direction, is in the shape of a neck as a consequence of having a width less than the maximum width of the root and less than the maximum width of the head.

The root may have a periphery which is curvilinear in side view, the curvilinear edge being sufficiently sharp to enable the insert to be forced into the carrier strip from one side thereof, optionally being forced into a pre-formed pilot slot or hole in the carrier strip with attendant displacement and deformation of the material of the carrier strip, prior to the tooth being secured in position by brazing.

#### Brief Description of the Drawings

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figures 1 to 3 are perspective views of three individual teeth according to the invention;

Figure 4 is a composite view illustrating in end view the three teeth of Figures 1 to 3;

Figure 5 is a perspective view of a first form of carrier strip showing teeth being mounted therein;

Figure 6 is a side elevation of the carrier strip of Figure 5,

Figure 7 is a perspective view showing the three teeth of Figures 1 to 3 mounted in the carrier strip of Figure 5; and

Figure 8 is a side elevation corresponding to Figure 6, but showing an alternative shape of carrier strip.

#### Detailed Description of the Drawings

Referring to Figures 1 to 3, each tooth is moulded from tungsten carbide material in the shape illustrated, the tooth having a head 1 and a root 2 with a transition region 3 therebetween. Each head 1 has a planar front face 4, planar sides 5 and a planar rear face 6. As can be seen from Figure 4, the planar sides 5 are non parallel, converging slightly in a direction towards the root 2 of the tooth. Each root 2 has planar parallel side faces 7 which join a convex curved wall 8 along curved edges, giving the root 2 a part-circular shape in side view. On one side of the tooth, the curved edge acts as a cutting edge when the tooth is mounted on the edge of the carrier strip.

At the transition region 3, the convex wall 8 merges smoothly into a concave wall at the front of the tooth and into a concave wall at the rear of the tooth, these two concave walls merging into respective shoulders where they are adjoin the head of the tooth. As a result, when each tooth is viewed from the side the transition region 3 forms a neck which has a narrower width than the maximum width of the head 1 and a narrower width than the maximum width of the root 2.

The teeth of Figures 1 to 3 differ in the shapes of the upper portions of their heads. The tooth of Figure 1 has a comparatively large chamfer 9 formed (by moulding of the tooth) along each top edge, the tooth of Figure 3 has a comparatively small chamfer 9 formed along each top edge and the tooth of Figure 2 has an intermediate size of chamfer 9. As a consequence, the front cutting faces 4 of the teeth present different shapes and different cutting areas. The teeth of Figures 1 to 3 may also differ in composition.

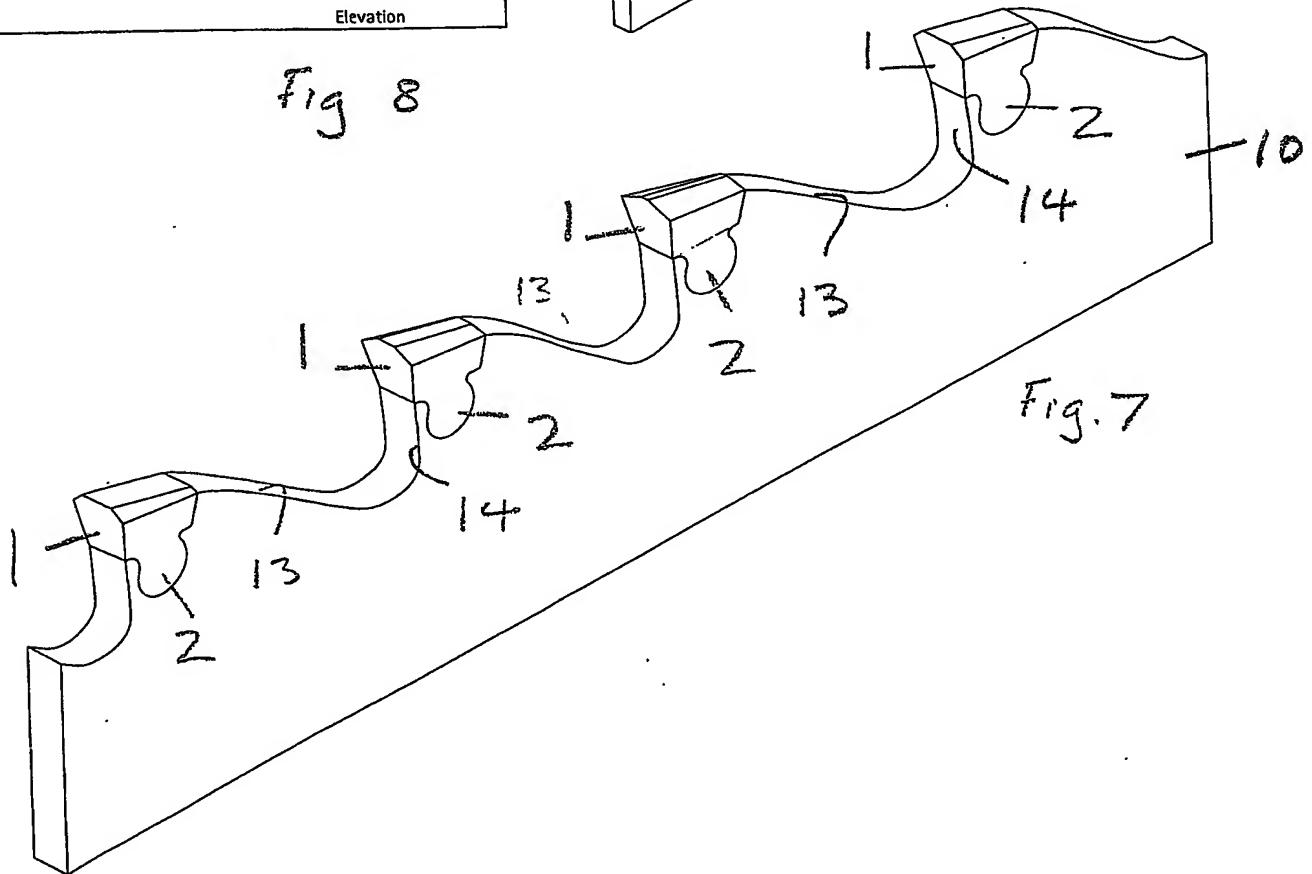
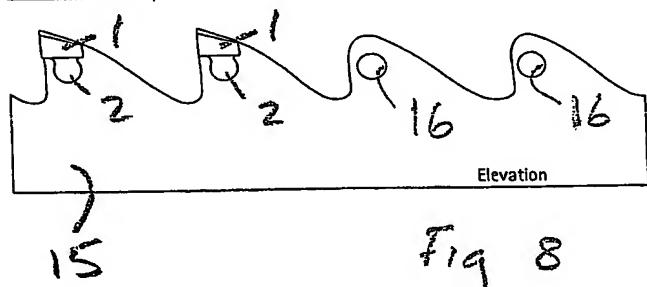
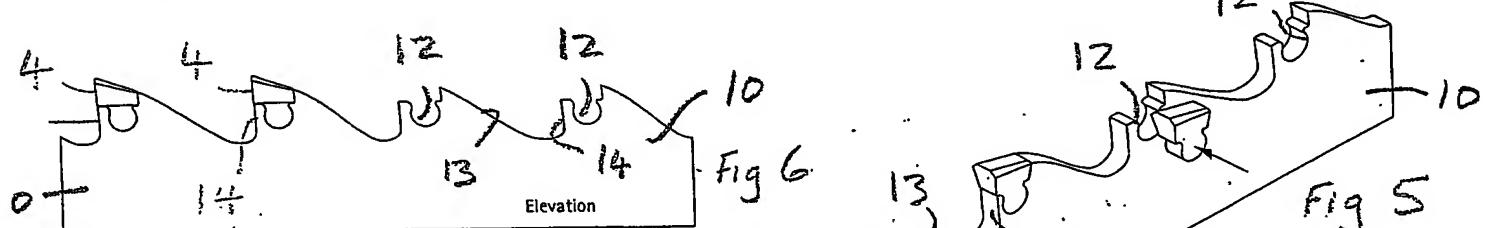
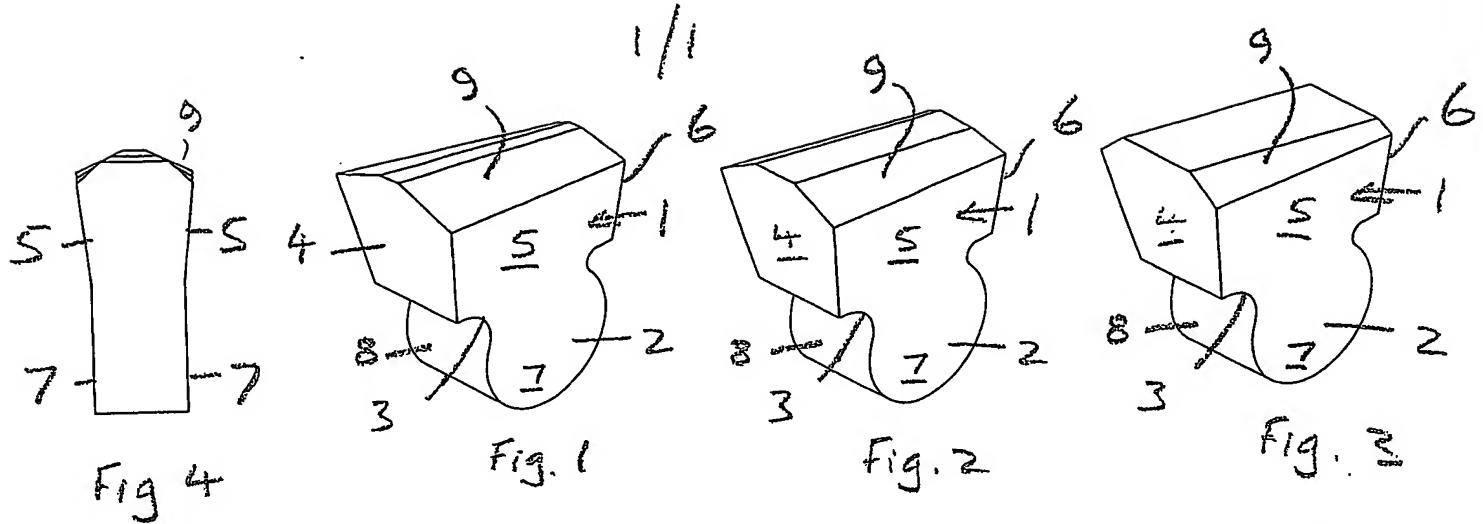
The three teeth of Figures 1 to 3 form a group of three teeth which are mounted in the carrier strip 10 Figures 5 and 6 which is made from a flexible steel strip which is comparatively soft in relation to the hard material of the teeth. The carrier strip 10 is punched to have the profile shown in Figure 6, there being at regularly spaced positions a series of apertures each in the form of an arcuate slot 12 open to the edge of the carrier strip 10. Between adjacent slots 12 the carrier strip edge has an inclined portion 13 merging into a vertical portion 14.

The root 2 of each tooth is oversize in relation to the slot 12 and each root is forced into a corresponding slot 12, as indicated by the arrow in Figure 5, with attendant displacement and deformation of the material of the carrier strip 10. When the teeth have been located in the carrier strip edge in this manner, the teeth are anchored in the carrier strip by brazing. The shape of the neck and the provision of shoulders between the neck and the head contribute to a firm attachment of each tooth in the strip 10. As best seen from Figure 6, the front face 4 of each tooth forms a smooth continuation with the corresponding vertical wall portion 14 and the inclined wall portion 13 forms a smooth continuation of the chamfered top edge of each tooth. By pre-forming the shapes of the teeth, there is no need for a grinding operation to be carried out, although a small degree of finish grinding may be carried out.

Figure 7 shows the group of three teeth mounted in the carrier strip 10 and also the first tooth of the next group. Thus, the resulting linear edge saw blade has successive groups of teeth, with each group consisting of the three teeth shown in Figures 1 to 3. The cutting direction is towards the left as the blade is viewed in Figure 7.

Figure 8 shows a modified shape of carrier strip 15 where each aperture is in the form of a hole 16 punched through the strip near the edge of the latter, instead of being a slot open to the edge of the strip. Each tooth is punched into a corresponding hole 16, the result being as shown at the left hand end of Figure 8.

Figures 5 to 8 show carrier strips 10 and 15 where the teeth are forced into pre-formed apertures from the side of the carrier strip. Instead, the teeth may be forced downwardly, into slots in a carrier strip, relying on the elasticity of the latter to receive and then retain the teeth prior to brazing.



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